Port Dolphin Energy LLC

Environmental Evaluation
(Cultural Resources)

Volume II, Section 5

Deepwater Port License Application

Port Dolphin Project, Tampa Bay, Florida

PUBLIC

Volume II, Section 5

Environmental Evaluation (Cultural Resources) (Public)

Table of Contents

Page

LIST OF FIGURES

LIST OF ACRONYMS

Acronym	Definition
ACHP	Advisory Council on Historic Preservation
AHTS	Anchor handling tug supply
AIV	Assisting installation vessels
AP	Anchor pile
AP	Aquatic Preserves
APE	Area of Potential Effect
AQRV	Air Quality Related Value
ARO	Abrasive resistant overlay
ATON	Aids to navigation
BACT	Best Available Control Technology
BEBR	Bureau of Economic and Business Research
BMPs	Best management practices
Bscfd	Billion standard cubic feet per day
CAA	Clean Air Act
CBC	Christmas Bird Count
CFR	Code of Federal Regulations
CI	Compression ignition
CMS	Continuous monitoring system
COMPS	Coastal Ocean Monitoring and Prediction System
CO-OPS	Center for Operational Oceanographic Projects and Services
COTP	Captain of the Port
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB[A]	Decibels of the A weighted scale
DEP	Department of Environmental Protection
DGPS	Differential Geo-Stationary Positioning System
DNV	Det Norske Veritas
DO	Dissolved oxygen
DOI	Department of the Interior
DOQQs	Digital Ortho Quarter Quads
DP	Dynamic Positioning
DSM	Demand-side Management
DWP	Deepwater port
DWPA	Deepwater Port Act
EE	Environmental Evaluation
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIA	Energy Information Administration
EMD	Environmental Management Department
EPA	Environmental Protection Agency
EPC	Environmental Protection Commission
EPCHC	Environmental Protection Commission of Hillsborough County

Acronym	Definition
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute
EVS	Economically-valuable species
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FAAQS	Florida ambient air quality standards
FAD	Fish Attracting Device
FBE	fusion bond epoxy
FCHP	Florida's Office of Cultural and Historical Programs
FCMA	Florida Coastal Management Act
FCMP	Florida Coastal Management Program
FDEP	Florida Department of Environmental Protection
FEECA	Florida Energy Efficiency and Conservation Act
FERC	Federal Energy Regulatory Commission
FGDL	Florida Geographic Data Library
FIM	Fishery Independent Monitoring
FLAG	Federal Land Managers Air Quality Related Group
FLUCCS	Florida Land Use, Cover and Forms Classification System
FMPs	Fishery Management Plans
FMRI	Florida Marine Research Institute
FNAI	Florida Natural Areas Inventory
FOP	Federal Operating Permit
FPSC	Florida Public Service Commission
FSRUs	Floating Storage and Regasification Units
FSS Code	Fire Safety Systems
FTP Code	Fire Test Procedures
FWC	Florida Fish and Wildlife Conservation Commission
FWCA	Fish and Wildlife Conservation Act
FWRI	Fish and Wildlife Research Institute
GCU	Gas Combustion Unit
GDEM	Generalized Digital Environmental Model
GIS	Geographic information system
GMFMC	Gulf of Mexico Fishery Management Council
GoM or Gulf	Gulf of Mexico
GOMOS	Gulf of Mexico Oceanographic Study
HAP	Hazardous Air Pollutant
HAPC	Habitat Areas of Particular Concern
HB	Hillsborough Bay
HDD	Horizontal Directional Drilling
HMS	Highly migratory species
HPAHs	High molecular weight polycyclic aromatic hydrocarbons
HPAPs	Habitat Protection Advisory Panels

Acronym	Definition
HPC	Habitat Protection Committee
ICE	Internal combustion engines
IEC	International Electro-Technical Commission
IGC Code	International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
IMDG Code	International Maritime Dangerous Goods Code
IMO	International Maritime Organization
ISM	International Safety Management
ISPS Code	International Code for the Security of Ships and of 1 July 2004 Port Facilities
ITU	International Tele-Communications Union
IWAQM	Interagency Workgroup on Air Quality Modeling
JCP	Joint Coastal Permit
Labins	Land Boundary Information System
Ldn	day-night sound level
LNG	Liquefied Natural Gas
Lnight	Nighttime sound level
LTB	Lower Tampa Bay
MARAD	U.S. Department of Transportation Maritime Administration
MARPOL	International Convention for the Prevention of Pollution from Ships
MBTA	Migratory Bird Treaty Act
MGD	Million gallons per day
MIV	Main Installation Vessel
MLW	Mean low water
mmbtu/hr	Million British thermal units per hour
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
mmscfd	million standard cubic feet per day
MPAs	Marine protected areas
MRFSS	Marine Recreational Fisheries Statistical Survey
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act of 1976
MTB	Middle Tampa Bay
NAAQS	National Ambient Air Quality Standards
NDBC	National Data Buoy Center
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGVD	National Geodetic Vertical Datum
NHC	National Hurricane Center
NHPA	National Historic Preservation Act
NNSR	Nonattainment New Source Review
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic & Atmospheric Administration National Marine Fisheries Service
NODC	National Oceanographic Data Center

Acronym	Definition
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NTL	Notices to Lessees
NTU's	Nephelometric Turbidity Units
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
ODMDS	Ocean Dredged Material Disposal Site
OFWs	Outstanding Florida Waters
OTB	Old Tampa Bay
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated biphenyls
PLEM	Pipeline end manifold
PM	Particulate matter
PORV	Pilot Operated Relief Valve
ppm	Parts per million
ppt	Parts per thousand
PSD	Prevention of Significant Deterioration of Air Quality
psu	Practical salinity units
PTS	Plow Trenching System
RMP	Risk Management Program
ROI	Region of influence
ROSS	Reconnaissance Offshore Sand Search
ROV	Remotely operated vehicle
ROW	Right-of-way
SAFMC	South Atlantic Fisheries Management Council
SAR	Search and Rescue
SCR	Selective catalytic reduction
SEAMAP	Southeast Area Monitoring and Assessment Program
SHPOs	State Historic Preservation Offices
SILs	Significant Impact Levels
SIP	State implementation plan
SOLAS	Safety of Life at Sea
SRV	Shuttle and Regasification Vessels
STCW	International Convention on Standards of Training, Certification and Watchkeeping
STL	Submerged Turret Loading

Acronym	Definition
SWFWMD	Southwest Florida Water Management District
TBEP	Tampa Bay Estuary Program
TECO	Tampa Electric Company
TMDLs	Total maximum daily loads
TN	Total nitrogen
TO	Thermal oxidizer
TOC	Total organic carbon
TP	Total phosphorus
tpy	Tons per year
TSS	Total suspended solids
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USF	University of South Florida
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWS	Upper wire segments
VOCs	Volatile organic compounds
WOA05	World Ocean Atlas 2005 climatology

5. CULTURAL RESOURCES

Port Dolphin Energy LLC (Applicant) is filing for a license pursuant to the Deepwater Port Act of 1974, as amended (DWPA), and the United States Coast Guard's (USCG) regulations, 33 C.F.R. Part 148 (2006), to construct, own and operate a deepwater port. The unloading portion of the deepwater port, named *Port Dolphin*, would be located in federal waters approximately 28 miles (45-kilometers) offshore of the Tampa Bay area of Florida in approximately 100-feet (30-meters) of water (**Figure 5-1**). This area lies within the St. Petersburg block of the Outer Continental Shelf (**Figure 5-2**).

The *Port Dolphin* deepwater port would be capable of mooring Shuttle and Regasification Vessels (SRVs) and is intended to provide a diverse and resilient source of natural gas delivery. The SRVs are vessels designed to carry liquefied natural gas combined with a capability to regasify the natural gas prior to off-loading it for transport to shore. These vessels would have a capacity range of 145,000 cubic meters (m^3) to 217,000 m^3 of natural gas in a liquid state cooled to -261º F. The SRVs themselves are almost entirely propelled by comparatively clean-burning natural gas, which significantly reduces their environmental impact compared to conventional vessels.

Up to two SRVs would temporarily moor at the proposed deepwater port by means of a submerged loading buoy system. Two unloading buoys, also known as submerged turret loading (STL) Buoys, would be separated by a distance of approximately 3.1-miles (5-kilometers). The unloading buoys would moor each SRV on location throughout the unloading cycle. Each unloading buoy would have eight mooring lines consisting of wire rope and chain. The mooring lines would connect each unloading buoy to eight anchor points most likely consisting of driven piles on the seabed.

An SRV would typically moor at the deepwater port for between four and eight days, depending on vessel size and send-out rate. The two separate buoys would allow natural gas to be delivered in a continuous flow, without interruption, by scheduling an overlap between arriving and departing SRVs. The unloading buoy technology and associated equipage proposed for *Port Dolphin* is similar to that used in the *Gulf Gateway* deepwater port and is planned for the *Northeast Gateway* and *Neptune* projects as well as being proposed for the *Calypso* project. The technology has also been successfully used at several locations overseas, including the North Sea.

When not connected to an SRV, the unloading buoy would be submerged 60-70 feet (18-21 meters) below the sea surface. In this position, the buoy would be held in position by the mooring lines and would be resting on the STL Buoy landing pad. A marker buoy and retrieval line would be used to locate and recover the buoy as the SRV arrives at the deepwater port. The unloading buoy would be retrieved from its submerged position by means of a winch and recovery line. It would be hoisted up through a moon-pool in the forward part of the SRV where it would be located in a receiving cone within the hull trunk. After the buoy is locked in position, unloading of natural gas would begin. The gas would be unloaded through the flexible riser into the pipeline end manifold (PLEM) for transportation to shore via the subsea pipeline.

The SRVs would be equipped to transport, store, vaporize, and meter natural gas. The SRV would have insulated storage tanks for the liquefied natural gas located within its hull. Each tank would be equipped with an in-tank pump to circulate and transfer liquefied natural gas, at a temperature of approximately -261 degrees Fahrenheit (ºF), to the vaporization facilities located on the deck of the SRV. The vaporization system would have a closed-loop cycle utilizing glycol/water brine as the re-circulating heating medium. This re-circulating medium would heat the liquefied natural gas and the medium itself would be warmed using re-circulating water heated by steam from the SRV's boilers.

Initially, it is expected that the average daily throughput of the port will be approximately 400 million standard cubic feet per day (mmscfd). When fully operational, *Port Dolphin* would be capable of achieving an average throughput of 800 mmscfd and a peak capacity of approximately 1200 million mmscfd. Natural gas would be sent out, by means of a 16-inch flexible riser from each buoy down to two 36-inch subsea flowlines through a piggable-Y to a 36 inch gas transmission line. The gas transmission line would transport natural gas to onshore facilities for interconnection with the Gulfstream Natural Gas System and Tampa Electric Company ("TECO") located, respectively, approximately 3.6-miles (5.7-kilometers) and 5.8-miles (9.2-kilometers) inland in Manatee County, Florida. From there, the natural gas would be available to serve residential, commercial, industrial and electrical generation customers primarily in Florida and the Southeastern United States.

Construction of *Port Dolphin* would proceed in two phases, lasting a total of approximately 22 months, with the port expected to commence operations in the second quarter of 2011. The first phase would consist of the offsite fabrication of major components including the unloading buoys (STL Buoys) and associated equipment and marine piping. The second phase would consist of siting the STL Buoys and associated equipment and laying the marine pipeline. Separate construction activities would involve the construction of the onshore interconnection facilities in Manatee County, Florida that are described in a companion application to be filed with the Federal Energy Regulatory Commission under Section 7 of the Natural Gas Act.

Section 5 of the Environmental Evaluation (EE) addresses possible effects on underwater cultural resources of the proposed *Port Dolphin* throughout the installation, operation, and decommissioning of the project. International, federal, and state regulations regarding the cultural resource aspects of a deepwater port are discussed in **Section 5.1**. All vessels involved in support of construction or monitoring operations activities for *Port Dolphin* will operate under protocols defined by international, federal, and state regulations, as well as comply with applicable laws and submit required permits. **Section 5.2** discusses the existing environment within the project area, including prehistoric and historic resources in the Tampa Bay area. Environmental consequences to the existing environment from the installation, operation, and decommissioning of *Port Dolphin* are discussed in **Section 5.3,** including the preferred route and alternate routes. Cumulative impacts to the environment and comparison of alternate routes are discussed in **Sections 5.4** and **5.5**, respectively. Mitigation measures identified to minimize the potential impacts that *Port Dolphin* may have on cultural resources, as well as a summary of the

potential impacts are presented in **Section 5.6**. A more detailed discussion of geophysical survey results and cultural resource findings can be found in Volume **III, Section 2 (Confidential)**.

Figure 5-1
General Site Location

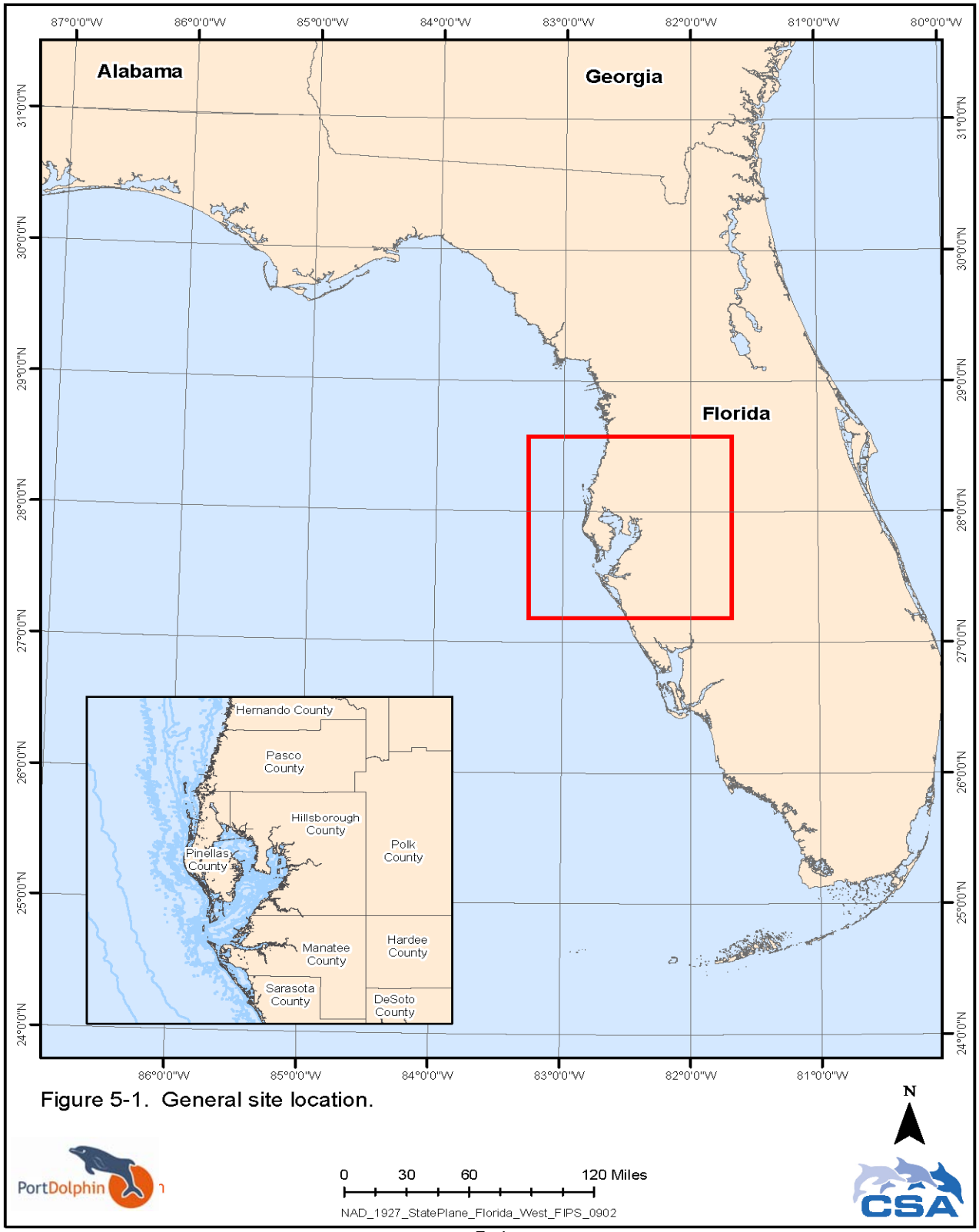


Figure 5-1. General site location.

Figure 5-2
Preferred and Alternative Pipeline Routes

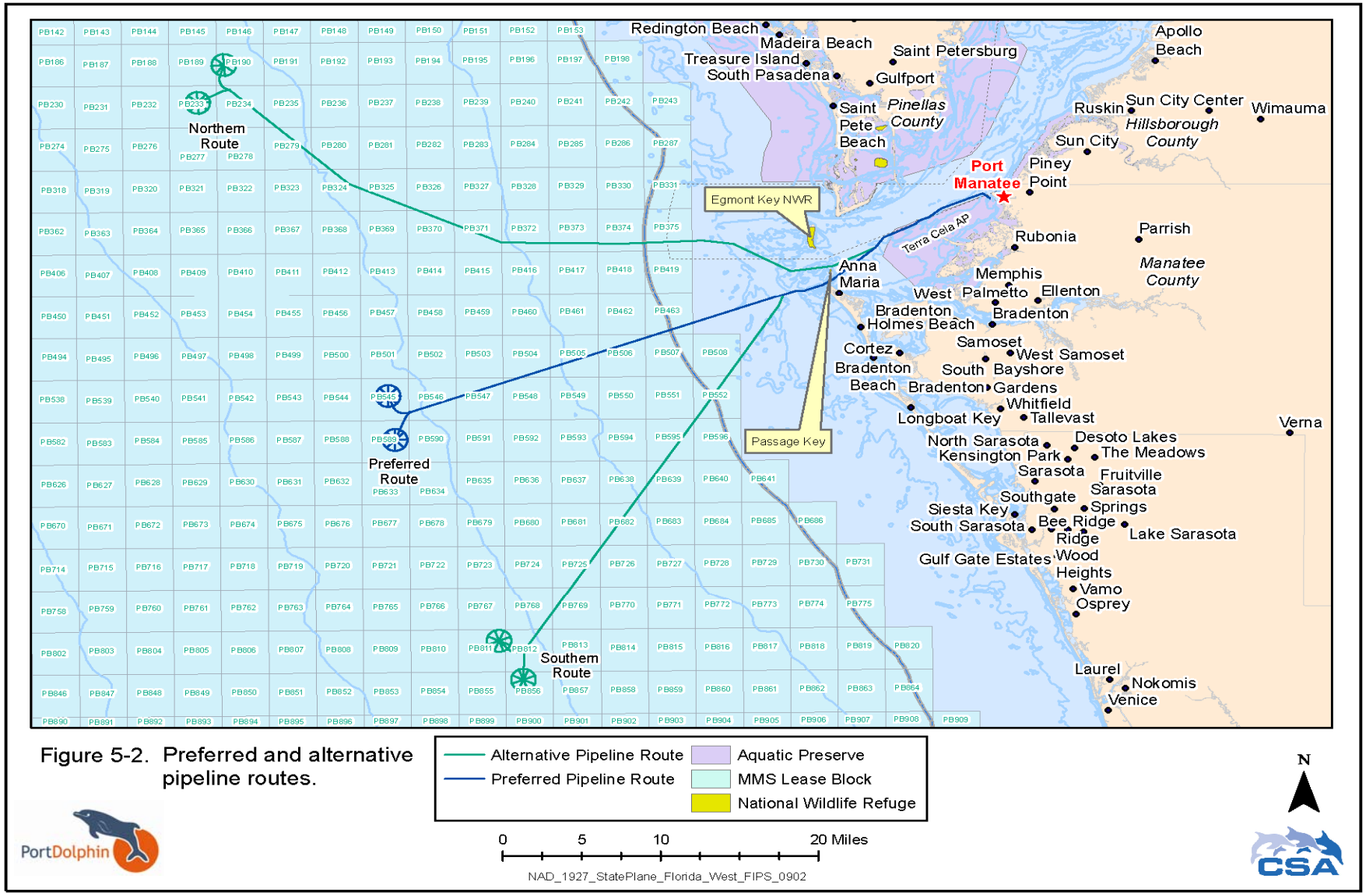


Figure 5-2. Preferred and alternative pipeline routes.

5.1 Regulatory Environment

The proposed *Port Dolphin* project will be located in both federal and state waters and will be subject to federal and state laws and regulations established by NOAA, Department of the Interior, Minerals Management Service (MMS), and the state of Florida under the provisions of federal and state laws listed below. The areas of the proposed project in federal waters will also be subject to regulations of the state of Florida's Office of Cultural and Historical Programs (FCHP), in accordance with Florida Coastal Management Program (FCMP). The following sections provide a review of the federal and state cultural resource regulations and discuss the applicability of each regulation to the proposed project.

5.1.1 Federal

The 1966 National Historic Preservation Act (NHPA [Public Law 89-665, as amended by Public Law 96-515; 16 United States Code (U.S.C.) 470 et seq.]) provides for the establishment of the National Register of Historic Places (NRHP) to include historic properties such as districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, and culture. Section 106 of the NHPA requires that federal agencies with jurisdiction over a proposed federal project take into account the effect of the undertaking on cultural resources listed or eligible for listing on the NRHP and afford the State Historic Preservation Offices (SHPOs) and the Advisory Council on Historic Preservation (ACHP) an opportunity to comment with regard to the undertaking.

The NRHP eligibility criteria have been defined by the Secretary of the Interior's Standards for Evaluation (36 Code of Federal Regulations [CFR] Part 60). Properties are considered to be NRHP-eligible if they display the quality of significance in American history, architecture, archaeology, engineering, and culture that are present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, workmanship, feeling, and association; and:

> **Criterion A:** Are associated with the events that have made a significant contribution to the broad patterns of American history; or
>
> **Criterion B:** Are associated with the lives of persons significant in our past; or
>
> **Criterion C:** Embody the distinctive characteristic of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant or distinguishable entity whose components may lack individual distinction; or
>
> **Criterion D:** Have yielded or may likely yield information important in prehistory or history.

The process of agency reviews and assessment of the effect of an undertaking on cultural resources is set forth in the implementing regulations formulated by the ACHP (36 CFR Part 800, Protection of Historic Properties). In addition, other laws and guidelines are applicable to the proposed Project, including:

Executive Order 11593: Protection and Enhancement of Cultural Environment (16 U.S.C. § 470 [Supp. 1, 1971]);

Abandoned Shipwreck Act (Public Law 100-298, 43 U.S.C. § 2101-2106);

Native American Graves Protection and Repatriation Act (Public Law 101-601; U.S.C. §§ 3001-3013);

Determination of Eligibility for Inclusion in the NRHP (36 CFR Part 63);

Recovery of Scientific, Prehistoric, and Archaeological Data (36 CFR Part 66); and

Curation of Federally Owned and Federally Administered Archaeological Collections (36 CFR Part 79).

For the portion of the project in Federal waters, the USCG and MARAD defer to MMS guidance for cultural resources surveys on the Outer Continental Shelf (OCS), found in 30 CFR § 250.194, to determine whether cultural resources are present in the Area of Potential Effect (APE). MMS, a bureau of the U.S. Department of the Interior, has federal authority for protection of cultural resource on the OCS. The primary responsibility of the MMS is to manage oil, gas and mineral resources on the OCS and assess the impacts of all OCS activities on marine, coastal, cultural, and human environments. The focus of the MMS' archaeological resource protection program is to ensure that permitted activities do not adversely affect significant cultural resources on the federal OCS, in compliance with the requirements of Section 106 of the NHPA. The MMS has completed a series of archaeological baseline studies to define those areas of the OCS that have potential for historic and/or prehistoric archaeological resources. The *Port Dolphin* project is within designated high-probability areas for prehistoric and historic cultural resources. Marine archaeological surveys and reports are required for those areas defined as having archaeological potential prior to approval of any MMS-permitted activities. MMS archaeological survey and report requirements for the Gulf of Mexico are presented in MMS Notices to Lessees (NTL) 2005-G07 and 2006-G07.

5.1.2 State

In state waters, the state of Florida governs activities that may affect cultural resources. Applicable statutes of the state of Florida concerning cultural resources include the following:

Chapter 267 F.S., Florida Historical Resources Act

Emergency Archaeological Properties Acquisition Act of 1988 (Chapter 253.027, Florida Statutes)

Offenses Concerning Dead Bodies and Graves (Chapter 872, Florida Statutes)

Performance Standards for Submerged Remote Sensing Surveys (May 17, 2001) issued by the Florida Department of State, Division of Historical Resources

5.2 Existing Environment

A cultural resources evaluation for *Port Dolphin* was prepared and conducted in compliance with Section 106 of the NHPA, MMS requirements, and state requirements. The cultural resources report is included as an appendix of the Archeological and Hazards Survey (**Volume III, Section 2 (Confidential)).**

5.2.1 Prehistoric Resources

Previous geological and archeological studies have examined the sea level fluctuations of the late Pleistocene and early Holocene epochs (Curray 1960; Coleman and Smith 1964; Scholl, Craighead, and Stuiver 1967; Colquhoun and Brooks 1986; Coastal Environments, Inc. 1977, 1982, 1986; Garrison 1992). While complexities and differences occur between models based on local studies (Coquhoun et al. 1981; Colquhoun and Brooks 1986), the Holocene marine transgression is generally summarized as a rapid rise from 14,000 years B.P. to 6,000 B.P., with a slower transgression marked by periodic fluctuations from 6,000 B.P. to the present. Dunbar et al. (1992) and Faught and Donoghue (1997) suggest that the 40-meter (~130-foot) isobath offshore the western coast of Florida (outside of the survey area) represents a Paleo Indian or "Clovis Shoreline." By about 3,000 B.P., sea level reached its current stand.

Between 5,000 and 3,000 B.P., in response to the declining rate of sea level rise, the barrier islands across the mouth of Tampa Bay began to take on their present configurations. The regional west coast study reported on by Hines et al. (2001:25) showed that the barriers essentially exhibit the same basic stratigraphy, that of development by initial upward shoaling on a Holocene bedrock foundation dating to about 4,000 B.P., followed by the aggradation of sediments, and in some areas, by the progradation of sediments.

Predictive models based on correlations between prehistoric archaeological sites and geomorphic landforms, that have been proposed by Coastal Environments, Inc. (1977, 1982, 1986), Colquhoun, et al. (1981), Aten (1983), Kraft, et al. (1983), Gagliano (1984), Dunbar et al. (1989a and b, 1991), Faught (2003, 2004), Stright (1986, 1987, 1990) and others, suggest that submerged Paleo Indian and Archaic period sites in Florida may be associated with the natural levees, margins, point bars, and terraces of alluvial streams, the margins of bays, lakes and estuaries, sinkholes, and relict beach ridges. Numerous reports on investigations of Paleo Indian, Archaic, and later cultural occupations of now submerged landforms have examined these early land-man relationships off the coasts of Florida (Goggin 1964; Ruppe 1980; Stright 1987;

Dunbar, Webb, and Faught 1989; Murphy 1990; Milanich 1994:23). The identification of these or related landforms in presently submerged areas would represent high probability areas for the occurrence of prehistoric archeological sites.

Major features characterizing prehistoric site locations in coastal areas are accumulations of oyster (*Crassostrea virginica*) and clam (*Rangia cuneata*) shells, or shell middens. These commonly form large mounds, with some following linear trends of more than a half mile, and heights of more than 20 feet. The acoustic signature of such a site would be similar to that produced across a buried oyster reef: a high amplitude reflection on the upper surface with an acoustic void or wipe out below (CEI 1982; Berryhill, et al. 1984). In coastal areas, these mounds are found on the margins of channels and bays in brackish, or formerly brackish, water areas. Numerous sites have been recorded in coastal Florida. Their geographical location in relation to the bodies of water generally precludes their being mistaken for relict oyster reefs in the pinger or seismic profiles. At the scale used in the subbottom profiles for this project, a large midden could be readily identified.

Migration of the shoreline and its related features resulted from marine transgression and regression sequences. Typically, as sea level rose, the formerly upland landscape evolved through a sequence of fringing marsh, estuaries and lagoons, beach ridges, and eventually seafloor. Inundated sites are subjected to erosion from wave action, longshore drift, and processes associated with barrier island formation and migration (Murphy 1990:13; CEI 1977; Emory and Edwards 1966). The seaward faces erode during marine transgression while back barrier marshes and lagoons covered by sediments derived from the overwash and migrating barriers tend to evidence better preservation (Belknap and Kraft 1981:430). Sites covered by sediments in a low-energy environment such as lagoons should be well preserved. Silts and clays provide greater cohesiveness and stability as a matrix surrounding site components and such sediments can delay or prevent degradation from oxidation and decay of organic remains (Stright 1986; Grebmeier 1983). Sites associated with sands and gravels, indicative of higher-energy environments, are not as likely to be preserved in situ, although prehistoric artifacts can be present as lag deposits. Murphy's discussion of the processes impacting a combined historic shipwreck/Archaic Period underwater archaeological site, 8SL20, indicates that large dense objects will not be significantly laterally displaced, but will move vertically downward to rest on stable bottom sediments and are subsequently buried by increasingly less dense lighter sediments (Murphy 1990:15). Offshore sinkholes, similar to the Ray Hole Spring site situated in Federal waters about 32 km off the Florida Coast (Anuskiewicz 1988; Dunbar, Webb, Faught, Anuskiewicz and Stright 1989) may present in situ stratigraphy with associated archaeological features that describe environmental conditions and geohydraulic history at their time of subaerial exposure and during the subsequent inundation.

5.2.2 Historic Cultural Resources

Tampa Bay and its offshore approaches are the primary locations for possible shipwrecks, and many wrecks have been reported and documented in the Bay and along the west Florida coast that are representative of vessels dating from the Spanish and British periods of European colonization, through the American period of colonization and immigration of the 19th

century, to the present day. Colonial and historic period shipping routes commonly traversed this area, typically hugging the coast to provide access to trade and provisioning centers such as developed in Tampa, Pensacola, Mobile Bay, and Galveston.

An archival search was conducted to determine the presence or reported incidence of shipwrecks within or adjacent to the *Port Dolphin* area. No sites listed on the National Register of Historic Places are in the *Port Dolphin* project area. Reference to lists and charts published by the USCG's Local Notices to Mariners, the National Ocean Service Navigation Charts, the National Ocean Service AWOIS database (2007), Berman (1972), Marx (1985), Potter (1988), Singer (1992), and the MMS shipwreck database (Pearson et al. 2006) indicates that there have been numerous vessels reported lost from the colonial, historic, and modern periods off the coast of Florida, as well as in Tampa Bay, whose wreck sites remain undetermined.

No shipwrecks have been reported in the federal waters portion of the survey area (Pearson, et al. 2006). Numerous obstructions are listed in the AWOIS files, many of which have been designated artificial reefs.

5.2.3 Geophysical Survey

A comprehensive remote sensing survey of the *Port Dolphin* project area was conducted in October and November 2006. The geophysical instrumentation used included an echo sounder, side scan sonar (100 and 500 kHz frequencies collected simultaneously), marine magnetometer, and subbottom profilers. Navigation software was integrated with a differential global positioning system to provided horizontal control at a reported accuracy of $\pm$ 1 meter.

The survey grid over the buoy mooring area is comprised of primary track lines spaced 100-meters (~328 feet) apart with six tie lines about 1,000 meters (~3,280 feet) apart. The pipeline corridor in Federal waters was covered by parallel track lines spaced 50 meters (~164 feet) apart, providing a survey swath coverage of the corridor about 915 meters (3,000 feet) wide. In Florida State waters, the corridor width of 3,000 feet was continued, although the line spacing decreased to a 25-meter (82-foot) interval. Additional track lines were surveyed in Tampa Bay parallel to the fishing pier and the Sunshine Skyway Bridge. The survey grid was designed to provide complete coverage of the seafloor by the sonar and a representative sampling with the other systems. The primary survey lines that follow the project route (centerlines) are Lines 88, 196, 217, 165, 224, 23, 225, 164, 112, 222, 221, and 6. Portions of other lines provide centerline coverage where the route deviated to avoid specific features, such as sandbars.

Bathymetric and subbottom profiler data are used to provide information about water depths, seafloor topography, and subbottom stratigraphy. Subbottom profiler data interpretations serve to identify relict and submerged landforms, which may represent high probability areas for prehistoric archaeological sites.

Magnetometer and side scan sonar surveys aid in the identification of historic shipwrecks. Magnetometer surveys detect submerged iron and ferrous objects of varying sizes by measuring deviations in the earth's magnetic field. Side scan sonar data present an acoustic

view of the seafloor, and is used for the identification of anomalous features that may have a cultural origin, as well as sediment variations.

5.2.4 Cultural Resources Evaluation Summary of Findings

Objectives

The main objective of the cultural resource evaluation was to locate and identify cultural resources that exist in the project site area that potentially could be physically disturbed by project activities. Any potentially significant submerged cultural resources that might be eligible for listing on the National Register of Historical Places (NRHP) will require avoidance or additional archaeological investigation.

Prehistoric Resources

Throughout the data set analyzed, well to poorly defined relict channels were recorded, most of which appeared to follow a north-south trend. The channel margins occur at various depths below the seafloor dependent on sediment cover; most are within a few feet of the seafloor. Most of these features are fragmented, discontinuous from line to line, and the tops of these features appear truncated, probably during the Holocene marine transgression. Some of them may represent filled or collapsed sinkholes.

In the west central portion of the mooring area buried fluvial channels were recorded that do not appear significantly affected by erosion. The upper channel margins are buried by a sediment cover of about 10 feet. Axial depths were noted from 16 to 18 feet below mudline, and channel fill sediments are amorphous. The profiles indicate that overbank deposition may remain undisturbed. These features are identified as high probability areas for prehistoric archaeological sites.

Historic Cultural Resources

A total of 1,146 magnetic anomalies were recorded, of which 900 magnetic anomalies remain unidentified. Of these, 105 occur in Federal waters, and the remainder are in Florida waters.

Eleven (11) unidentified sonar contacts were recorded during the survey. Three occurred in Federal waters, the other eight are in Florida waters. Three of the sonar contacts (one in Federal waters, two in Florida waters) corresponded with unidentified magnetic anomalies.

The Phase 1 geophysical survey magnetometer and side scan sonar data cultural resources evaluation identified a number of features of potential cultural significance. Three unidentified side scan sonar contacts, of which one is in Federal waters, and 15 unidentified magnetic anomalies, all but one of which is in Florida waters, were interpreted as possible historic shipwreck remains.

5.3 Environmental Consequences

Adverse impacts to cultural resources occur when an activity is likely to damage or disturb a unique feature such as an historic site (shipwreck) or prehistoric site (former human occupation areas). The nature of any impacts to cultural resources as a result of project activities would be direct, in that the consequence of installation/decommissioning activities would have an immediate affect upon the resource. In all cases, the duration of environmental consequences to cultural resources resulting from project activities would be long-term or permanent, as opposed to temporary. In addition, any impacts to cultural resources may be irreversible.

Impacts were evaluated based on consequence-producing factors related to the following phases of the project:

Construction

Operations

Decommissioning

Upsets/accidents

Evaluation of impacts to cultural resources related to the *Port Dolphin* are presented in the following sections.

5.3.1 Preferred Location and Route

Construction

The primary potential impacts to cultural resources associated with construction activities would be potential impacts to prehistoric and historic sites.

Phase I geophysical surveys in and around the terminal revealed the presence of buried fluvial channels in St. Petersburg Area Blocks 545 and 589 that retain geomorphic features representing high probability areas for prehistoric archaeological sites. Although specific locations of prehistoric sites associated with these features are not known, the potential exists for undisturbed channel margins to retain these resources. Avoidance areas of 250 feet within and outside of one area of relict channels have been designated. Project installation activities, specifically Anchor 10 of the proposed south buoy, are located about 5,300 feet southeast of the prehistoric cultural resources avoidance area.

Construction would involve derrick/lay barges, anchor handling tug support vessels, and other support vessels. Potential disturbance of prehistoric sites could occur from anchors used by these vessels if used near or within the designated avoidance zones.

If prehistoric sites were encountered during construction, the impacts could be significant and irreversible. Proposed construction activities would be modified to avoid such areas, thus minimizing the degree of impact and subsequent significance of the impact.

Three unidentified side scan sonar contacts and 15 unidentified magnetic anomalies may represent possible historic shipwreck remains. Avoidance zones of 300-foot radii have been established around Sonar Contacts 1, 6, and 9. Magnetic Anomaly Nos. 15, 28, 29, 50, 53, 100, 185, 186, 196, 197, 200, 212, 213, 283, and 287 should all be avoided by a distance of 200 feet. Prior to commencing construction, any features that cannot be avoided will be investigated to assess their potential historic significance.

Operations

Once the port components are installed, there would be no further contact with the seafloor other than the periodic scouring of mooring anchor chains/cables. Since no potentially significant prehistoric or historic resources would be located within 1,000 feet of any port components, there would be no impacts on cultural resources by routine operations. Potential disturbance of prehistoric sites could occur from anchors used by support vessels if used near or within the designated avoidance zones.

Decommissioning

The proposed decommissioning procedure for the buoy is to remove the buoy, riser, umbilical, and mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. In the case of suction anchors, the anchors would either be left on the seabed (with some rock to cover the top of the anchor), or an attempt could be made to remove the anchors by injecting seawater (reverse installation process) and removing them completely from the seafloor. Subject to negotiated land lease conditions, the pipeline would be decommissioned by filling with seawater and leaving in place.

Impacts on prehistoric sites from decommissioning activities are not anticipated because terminal components would be more than 1,000 feet from any potential significant targets, and disturbance to the seabottom from decommissioning activities would be minimal. Potential disturbance of prehistoric sites could occur from anchors used by support vessels if used near or within the designated avoidance zones.

Accidents and Upsets

It is not anticipated that releases of LNG, natural gas, or other petroleum products would impact the seafloor. Therefore, cultural resources are not expected to be impacted by upsets or accidents.

5.4 Cumulative Impacts

NEPA requires that the cumulative impacts for any proposed project subject to NEPA be evaluated and discussed. A "cumulative impact" is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions." (40 CFR § 1508.7).

5.4.1 Relevant Projects and Activities for Cumulative Analysis

Based on research and communications with governmental agencies, the following projects in the Tampa Bay area have been identified that include activities potentially relevant for cumulative impact analysis, such as dredging, discharges, pipeline installation, etc. (discussed in detail in **Section 8.2**):

- **Existing Gulfstream Natural Gas Pipeline** – The Gulfstream Natural Gas System pipeline extends from Mississippi and Alabama across the Gulf of Mexico to Florida, making landfall at Port Manatee within Tampa Bay. The pipeline extends 239.5 miles in Florida through state waters, county waters, and across private and public lands. The distance of the *Port Dolphin* pipeline from the Gulfstream pipeline where they parallel offshore would typically be 250 meters, but at the Sunshine Skyway Bridge, they would be approximately 50 meters apart.

- **Phase IV Expansion of the Gulfstream Natural Gas Pipeline** – Gulfstream has proposed a Phase IV expansion of its pipeline. The proposed route for the Phase IV Extension extends approximately 17.8 miles from the existing Gulfstream pipeline in the vicinity of Port Manatee north across the middle bay to the existing Bartow Power Plant on the east shore of St. Petersburg. *See http://www.gulfstreamgas.com/phase4.htm*.

- **Maintenance and Other Dredging** – The USACE has been issued state permits for maintenance dredging projects in the Tampa Bay area, including for the non-federal Port Sutton navigation channel, the non-federal Big Bend channel, and the Egmont federal navigation channel. The Tampa Port Authority also has been issued permits for deepening berths at the Port of Tampa.

- **Dredged Material Disposal** – An active offshore ocean dredged material disposal site is located 20.7 miles offshore, well north of the Preferred Location and Route. (See **Figure 8-4**).

- **Port Expansions** – Both the Port of Tampa and Port Manatee include expansion projects such as warehouse and berth expansions and dredging projects within their current "visioning statements" and master plans for future growth and development.

- **Beach Nourishment** – The State of Florida has commissioned studies to identify sand resources off the southwest Florida coast for use in beach nourishment projects in Pinellas and Manatee counties. (See **Section 8.2**).

- **Desalination Plant** – The Tampa Bay Water Seawater Desalination Plant is presently under reconstruction and in a testing mode.

- **Power Plants** – The Bartow, Big Bend, and F.J. Gannon power plants intake seawater from and make thermal discharges into Tampa Bay.

- **NPDES Outfalls** – There are a variety of discharges into Tampa Bay from various municipal and industrial sources surrounding the estuary.

- **Vessel Traffic –** All manner of vessel traffic occurs in Tampa Bay, including commercial shipping, commercial fishing, recreational fishing, and the operation of charter vessels engaged in fishing, diving, and dolphin watching. In addition, several cruise lines operate out of Tampa.

5.4.2 Potential for Cumulative Impacts

According to USEPA (1999), the following are factors that may be considered in evaluating the potential for cumulative impacts:

- whether the resource is especially vulnerable to incremental effects;
- whether the proposed action is one of several similar actions in the same geographic area;
- whether other activities in the area have similar effects on the resource;
- whether these effects have been historically significant for this resource; and
- whether other analyses in the area have identified a cumulative effects concern.

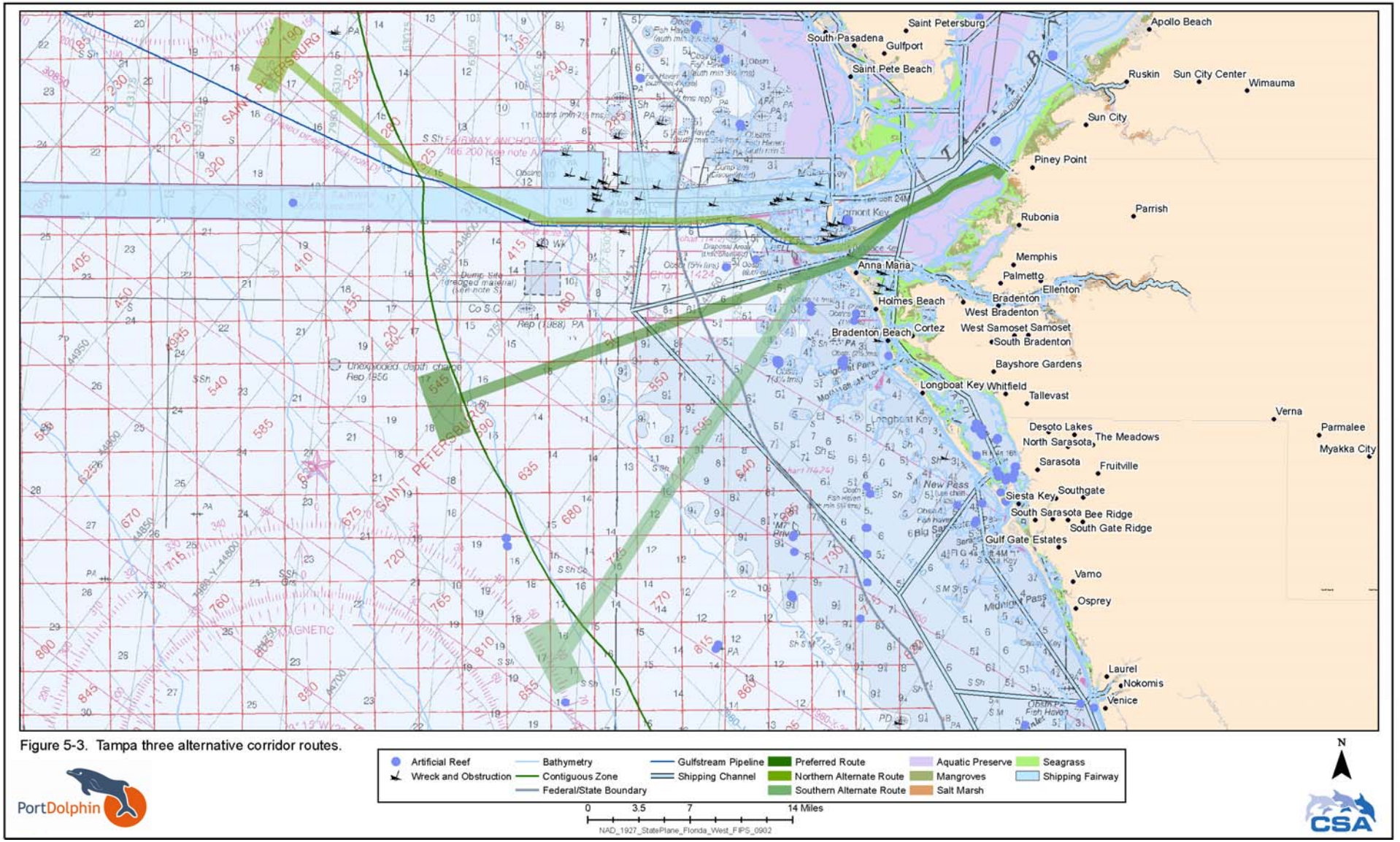
The only potential impacts to cultural resources posed by the *Port Dolphin* project would be disturbance of potential prehistoric or historic sites. Since cultural resources would be avoided during installation and decommissioning activities along the proposed pipeline route and port area, the *Port Dolphin* project would not contribute to any cumulative effects from the above-identified activities or any other activities in the project area. Many of the above-listed activities do not have and would not have an impact on underwater cultural resources.

5.5 Comparison of Alternatives

Two alternative sites for the port and the pipeline route have been proposed (**Figure 5-3**). Neither the Northern Alternate Route nor the Southern Alternate Route show any mapped shipwrecks or obstructions. The Northern Alternate Route, however, crosses shipping lanes, and thus there may be a higher possibility of shipwrecks to exist in this route area. The port and pipeline would be installed, operated, and decommissioned at the alternative locations in the same manner as at the proposed preferred site and route. As with the preferred site and route,

any areas of potential prehistoric or historic cultural resources would be avoided or investigated further prior to construction. Thus, impacts at alternative sites would be similar to those at the preferred site and route.

Figure 5-3
Tampa Three Alternative Corridor Routes



5.6 Summary of Potential Impacts from the Preferred Alternative and Mitigation Measures

In addition to the mitigation measures set forth below, Port Dolphin Energy LLC; its affiliated parent company, Höegh LNG AS (Höegh); and other affiliated companies have a deep and broad commitment to environmental stewardship, sustainability, and social responsibility. Höegh's objective is to continuously seek to reduce the impact of its activities on the environment. Höegh not only strives to comply with all applicable environmental conventions, laws, and regulations, but seeks to go beyond these requirements. Through its environmental policy, Höegh is taking active measures to seek new technology and methods to go beyond these requirements. As examples, Höegh and affiliated companies have made it their goal to reduce the risk of spreading invasive or harmful organisms through ballast water; to reduce emissions of exhaust gases to the atmosphere by reducing consumption of lubricating oil; and to reduce the consumption of and impacts from chemical cleaners. In addition, Höegh's affiliated company, Höegh Fleet Services, has instituted a compliance program that includes upgrading and improving bilge water systems on board, improving routines and procedures for waste stream handling, introducing an extensive MARPOL inspection and training scheme on board, and developing a training course in "bilge water/waste oil operation," and reporting to the USCG. It is Höegh's policy to be open and transparent, and this policy includes the publication of an annual environmental and sustainability report that details the company's efforts in these arenas.

The port site and proposed pipeline route have been designed to avoid prehistoric and historic cultural resources. Installation, operation, and decommissioning activities would avoid impact to resources, if found. If avoidance of these areas of potential resources is not possible, then these resources would be retrieved and curated at a state or federally recognized facility in accordance with applicable procedures.

In the event of unanticipated discovery of cultural resources, Port Dolphin would follow an unanticipated discoveries plan. Under this plan, all activity in the area of work would be halted immediately, and an avoidance zone of at least 1,000 feet for further work in that area would be established. Within 48 hours of the discovery, the Regional Supervisor, Leasing and Environment, and the archaeologists at the MMS office in New Orleans, as well as the USCG and the appropriate Florida State Historic Preservation Officer (SHPO) with the Florida Division of Historical Resources would be notified of the discovery.